REMARKS

Reconsideration of the application is respectfully requested.

Beginning with page 2 of the Office Action, the drawings have been objected to as not showing the limitations recited in dependent claim 28. In response, Applicant observes that claim 28 depends from claim 23 which recites a processor coupled to a non-volatile storage device. Claim 28 further describes the processor as having a hardware architecture that is pipelined and in which branch mispredictions cause a significant performance penalty. The important limitation, however, is a "processor" which is clearly depicted in Fig. 5, as reference number 504. Accordingly, reconsideration and withdrawal of the objection to the drawings is respectfully requested.

The objection to claim 4 regarding the phrase "$Y <= 2$" has been addressed as suggested on page 3 of the Office Action. A similar amendment has been made to claim 15. Accordingly, reconsideration and withdrawal of the objection to the claims is respectfully requested.

Claims 3 and 5 stand rejected as being indefinite, particularly regarding the limitations "$Y*G^k$" and "B_j". Additional descriptive material has been added to claim 3, as well as to claims 14 and 25, providing clear antecedent basis for G and B_j.

As to claim 5, this claim was rejected as being indefinite for having improper antecedent basis for the $_j$ in $T_{j,hi}$ and $T_{j,lo}$. Applicant, however, points out that the $_j$ is simply used to associate the T_{hi} and T_{lo} values with a corresponding B value, which may be used to index into the lookup table. In other words, each selected breakpoint B_j may yield a respective pair of lower precision values T_{jhi} and T_{jlo}. Accordingly, there is no need to further describe the $_j$ in these limitations.

Turning now to the art rejections, some of the claims stand rejected as being anticipated by Fig. 1 provided in Applicant's Specification as filed, which is labeled "Prior Art". Applicant respectfully disagrees with this rejection for the following reasons.

Beginning with claim 1, a computer implemented method for approximating a function of an input argument is described, where one of a number of breakpoints is selected such that a reduced argument for the function is less than the predetermined value, and an approximate function of the reduced argument is evaluated by accessing a lookup table based on the selected breakpoint, to obtain a value of a term in the approximate function. **The lookup table has a breakpoint for which the reduced argument can be computed without round off error, when the input argument is close to a root of the function**. There is no teaching or suggestion to so modify the table-lookup methodology depicted in the right-side flow of Fig. 1.

In Fig. 1, when the input argument X is not close to the root of the function being approximated, that is the result of decision block 102 is "No", the table-lookup methodology on the right-hand side consisting of operations 104-116 is taken to compute the transcendental function. It should be noted that Fig. 1 as filed contains an obvious mistake in that the "Yes" and "No" designations on either side of the decision block 102 have been inadvertently reversed. A separate sheet showing a correction to this obvious clerical mistake, together with a replacement sheet, is enclosed with this amendment.

Returning to the computation using the right-hand side flow of Fig. 1, any of the breakpoints (B) that may be used to index into the table-lookup to compute the reduced argument R result in substantial round off error when the input argument is close to a root of the function being approximated. In other words, none of the entries in the table-lookup methodology (right-hand side) of Fig. 1 is associated with any breakpoint for which the reduced argument R can be computed without round off error in situations where, for example, $|X-1|<2^{-4}$. That is why a separate, left-hand side flow is provided for those situations.

In contrast, according to an embodiment of the invention, the conventional methodology is modified so that the lookup table has a breakpoint for which the reduced argument can be computed without round off error, when the input argument is close to a root of the function. As stated in the Specification, at paragraph 13:

This modification helps avoid the loss of precision encountered during the right-hand flow of **Fig. 1** when the input argument is closer to 1 by less than, for instance, 2^{-9}. The modified breakpoint values allow the same flow to be used for all values of the input argument, even when close to a root of the function being evaluated.

Also, at paragraph 32:

The various embodiments of the branch-free methodology described above avoid the conventional numerical problems of table-lookup techniques which occur near the root of the transcendental function. Since there are a relatively small number of table values that create this numerical imprecision near the root of the transcendental function, where in the above examples it was one or both of the endpoint values B_0 and B_N, the branch-free methodology ensures that these small number of values are exact, such that no roundoff errors are present. For instance, in the case of the logarithm function, this was insured by setting $B_0 = 1$ such that the table value is 0. Alternatively, this could be insured by setting $B_N = 1/2$ and the table value there is exactly that stored for $\log_b (2)$ such that the terms in the approximate function that include B_N and $\log_b 2$ cancel each other when $k = -1$, leading to exactness.

Such a breakpoint is selected (to compute the reduced argument) when the input argument X is deemed close to a root of the function being evaluated. As further explained in the Detailed Description of the Specification as filed, at paragraph 22:

Thus, taking the logarithm function as an example, its root is at $X = 1$. Accordingly, as the value of X approaches 1, it may be expressed as either $1.000 \ldots 001 * 2^0$ or $1.999 \ldots 999 * 2^{-1}$. If X is expressed by the former, then the selected breakpoint is $B_0 = 1$ when $|Y-1|$ is less than delta. If the latter, then the breakpoint selected is $B_N = 1/2$ when $|Y-2|$ is less than delta.

By providing one or more breakpoints that represent the situation where the input argument is deemed too close to the root, where such breakpoints result in the reduced argument being computed without any round off error, not only is the loss of precision associated with the right-hand flow of Fig. 1 avoided, but also the need for a separate program flow to compute the reduced argument in the special case (operations 120-128 of Fig. 1) is eliminated. Such a modification and associated benefit is not taught or suggested by the prior art known to the Applicant.

Claims 12 and 23 are also submitted as not being anticipated by Fig. 1, for at least the same reasons given in support of independent claim 1.

Although additional arguments and distinctions between the claims and the relied upon art references could be made here, in the interest of conciseness, the additional discussion is omitted. Nevertheless, a good faith attempt has been made to explain why the art rejections are improper and to present claims that are in better condition for allowance.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly, extension of time fees.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR, & ZAFMAN LLP

Dated: October 5, 2004

By ______________________
Farzad E. Amini, Reg. No. 42,261

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, California 90025
(310) 207-3800

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, Post Office Box 1450, Alexandria, Virginia 22313-1450 on October 5, 2004.

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Marghux Rodriguez *October 5, 2004*

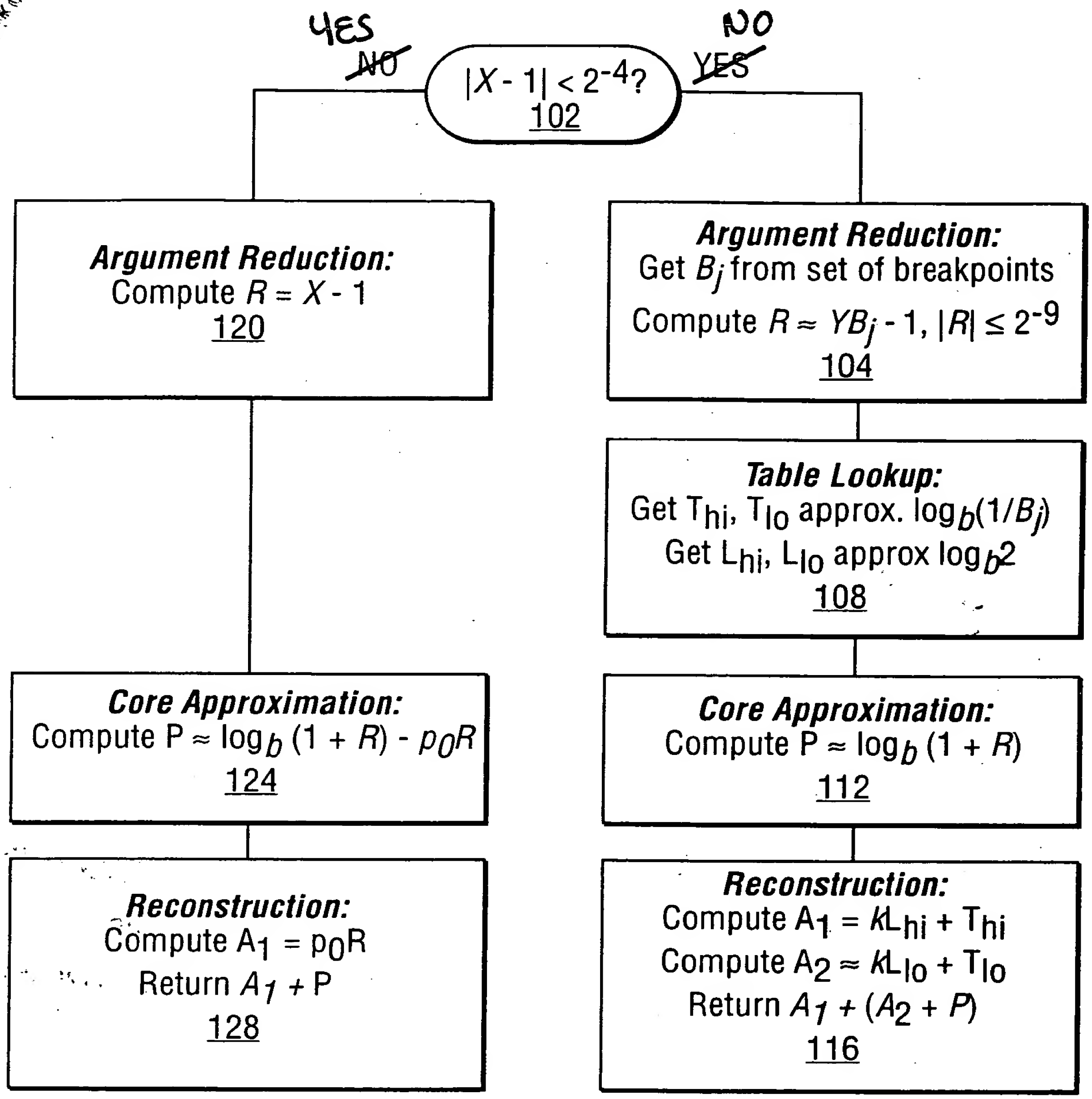

Table-Lookup Methology with a Branch, for $\log_b(X)$.

FIG. 1

(PRIOR ART)